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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/671,201	09/28/2000	Michiaki Sano	07553.0009	9091

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FINNEGAN, HENDERSON, FARABOW, GARRETT &  
DUNNER LLP  
1300 I STREET, NW  
WASHINGTON, DC 20005

EXAMINER

VINH, LAN

ART UNIT	PAPER NUMBER
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1765

7

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MF-7

**Office Action Summary**

Application No.

09/671,201

Applicant(s)

SANO, MICHIAKI

Examiner

Lan Vinh

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1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on Amendment filed on 04 April 2002.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 7-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/671,201.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 7-9, 35-37 are rejected under 35 U.S.C. 102(e) as being anticipated by Nguyen et al (US 6,043,164 )

Nguyen discloses a method for transferring a multilevel photoresist pattern formed on a substrate/workpiece in a plasma chamber. The photoresist pattern having an opening area larger than the hole formed in layer 32 ( fig. 8 ). This method comprises the steps of:

applying high-frequency (13.56 MHz) biasing power to the chuck in which the substrate/workpiece is held at a first power level of 800 W ( col 11, lines 51-55 )

flowing oxygen gas into the chamber while applying RF power level at a pressure of 2mT to generate plasma ( col 12, lines 11-15 ) reads on generating/raising the processing gas to a plasma

reducing the high-frequency power for biasing to the substrate from 800 W to 130 W during the partial removal of the photoresist profile 36 before the photoresist 36 is completely removed ( fig. 11 ) using oxygen gas ( col 12, lines 16-21; fig. 9 ) reads on switching the high-frequency power for biasing to the substrate from the first power to a

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second power lower than the first power before the photoresist film becomes completely removed

using oxygen gas before and after reducing the bias power ( col 12, lines 11-17 )

Regarding claims 8-9, 36-37, Nguyen discloses using photoresist 36 as a mask to form a pattern at a dielectric (silicon dioxide )/ organic film on the substrate ( col 14, lines 3-4 ; fig. 8 )

3. Claims 29-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Nguyen et al (US 6,043,164 )

Nguyen discloses a method for transferring a multilevel photoresist pattern formed on a substrate/workpiece in a plasma chamber. This method comprises the steps of:

etching a layer/film 32 using photoresist film 36 as a mask (fig. 8)

subsequently, removing/ashing the film 32 with a first biasing power level of 800 W partially through the photoresist film 36 ( col lines 13-15 and fig. 9 shows half of the photoresist film 36 is partially removed )

removing/ashing the film with a second lower biasing power level of 130 W ( col 12, lines 18-20 )

Regarding claims 30-31, 33-34, Nguyen discloses using photoresist 36 as a mask to form a pattern at a dielectric (silicon dioxide )/ organic film on the substrate ( col 14, lines 3-4 ; fig. 8 )

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4. Claims 18-28, 38-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Yang (US 6,218,084 )

Yang discloses a method for removing photoresist formed at a substrate/workpiece 200 having a portion 206 around the opening of the hole /fence portion placed in a plasma chamber. This method comprises the steps of:

etching the substrate/workpiece to form an opening ( col 3,lines 3-5 )

applying high-frequency bias power to the wafer/substrate at a first power level (300 W) to strip/remove portion 206 formed during etching ( col 3, lines 37-42 )

generating/raising the processing gas to a plasma ( col 3, lines 36-40 )

eliminating the high frequency bias power before removing the photoresist completely ( col 3, lines 43-45 ) reads on stopping the application of the high frequency bias power before removing the photoresist completely

using the same processing gas of oxygen/addtional gas before and after stopping the application of bias power ( col 3, lines 18-41 )

The limitation of claim 22 has been discussed above.

Regarding claim 23, Yang discloses reducing the bias power level to remove the portion 206/fence portion ( col 3, lines 44-45 )

Regarding claims 19-20, 24-25, 27-28, 39-40, Yang discloses using photoresist layer 204 as a mask to form a pattern at a dielectric (silicon dioxide ) layer 202/ organic film on the substrate (col 2, lines 3-5; fig. 2A )

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al (US 6,218,084 ) in view of Nguyen et al (US 6,043,164 )

Yang discloses a method for removing photoresist formed at a substrate/workpiece 200 having a portion 206 around the opening of the hole /fence portion placed in a plasma chamber. This method comprises the steps of:

etching the substrate/workpiece to form an opening ( col 3,lines 3-5 )  
applying high-frequency bias power to the wafer/substrate at a first power level (300 W) to strip/remove portion 206 formed during etching ( col 3, lines 37-42 )  
generating/raising the processing gas to a plasma ( col 3, lines 36-40 )  
reducing the high-frequency bias power to the wafer/substrate before completely removing the photoresist ( col 3, lines 43-45 )

Unlike the instant claimed inventions as per claims 10, 15, Yang does not specifically disclose switching the high-frequency bias power from the first power level to a lower second power level although Yang discloses reducing the high-frequency bias power.

However, Nguyen discloses a method for transferring a multilevel photoresist pattern comprises the step of reducing/ switching the high-frequency bias power from

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the first power level to a lower second power level before removing the photoresist completely ( col 12, lines 14-20 )

Since Yang discloses reducing the high-frequency bias power one skilled in the art would have found it obvious to modify Yang by reducing/ switching Yang's high-frequency bias power from the first power level to a lower second power level as per Nguyen because Nguyen states that during the step of lowering the bias power the resist covering the dielectric is completely removed ( col 12, lines 17-21 )

The limitation of claims 11-12 has been discussed above.

Regarding claims 13-14, 16-17, Yang discloses using photoresist 204 as a mask to form a pattern at a dielectric (silicon dioxide ) layer 202/ organic film on the substrate (col 2, lines 3-5; fig. 2A )

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 7-40 have been considered but are moot in view of the new ground(s) of rejection.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### ***Conclusion***

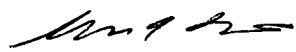
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.

LV  
June 28, 2002

  
BENJAMIN L. UTECH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700